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ABNORMALITIES
IN
HUMAN MYOLOGY.

BY

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LXIII. Abnormalities in Human Myology. By J. F. Knott, F.R.C.S.I.

[Read, April 11, 1881.]

The following is an imperfect list of the muscular anomalies which have come under my notice during the four winters which I have occupied the office of Demonstrator of Anatomy in the School of the Royal College of Surgeons. During that time I have paid particular attention to some of those which struck me in the commencement as being specially important or interesting, and which attracted my attention sufficiently to induce me to tabulate the frequency of their occurrence. As I had not the advantage of any co-operation in the research, a very large proportion of the anomalies which might easily have been preserved were necessarily lost, from the fact that it was impossible for me to distribute my attention over the dissection of so large a number of subjects as were always passing through the room. My statistics are, accordingly, in many instances, very imperfect, although by no means so, I hope, in all; but, although not so valuable as could be desired as an index of frequency, I venture to hope that the publication of the present collection will be found interesting to those who have devoted any attention to this special department of Anatomy. The importance attached to these variations must daily increase in connexion with the absorbing interest of the study of muscular morphology, and of the homologous elements thereof in the various grades of the animal kingdom. Viewed from this standpoint, an otherwise somewhat dry catalogue of variations in Human Myology will be looked upon with favour by those who hail with welcome the addition of every small contribution to the hourly increasing treasury of our knowledge in this, one of the most interesting departments of human study.

Occipito-frontalis.—The early removal of the brain prevented me from examining this muscle completely, in a large proportion of the subjects of our dissecting-room. The frontal portion I have seldom found to agree completely with the description given in our standard text-books. I have noted its peculiarities in twenty-eight cases, in which I examined it with special care. In only five of these did the fleshy fibres reach so high as the coronal suture. Below I have always found its fibres attached to the internal angular process of the os frontis, some being continued into the pyramidalis nasi, and levator labii superioris alaeque nasi, but the great bulk of the fibres blended with the orbicularis palpebrarum and corrugator supercilii, and a large proportion adhered to the deep surface of the skin of the eyebrow. I could never satisfy myself of an attachment of any of its fibres to the nasal bone, glabella, superciliary ridge, or supra-orbital arch, as has been described by different observers. In every case I examined, the deep surface of the muscle appeared to glide freely over those bony prominences, and to be connected thereto merely by loose areolar tissue. In one case a slip was found connected to the upper margin of the tendo oculi. In three examples there was a well-marked decussation of the lower fibres of the frontal portions of opposite sides. In many instances the muscle was found in an extremely atrophic condition, and in a large proportion its fibres were found split up into fasciculi, but in no case was it completely absent, as in the example noted by Professor Macalister.

Of the *occipitalis* muscle I have seen union of those of opposite sides in two instances, and decussation of the lower fibres in one case.

Transversus nuchae (F. E. Schultze).—Was present on both sides in five of the twenty-eight bodies, and on one side only in two others. The muscle is said to be always symmetrical, but in the latter instances I could find no muscular fibres on the opposite side, but a small transverse tendinous band took its place. The attachments were the same in all: from the external occipital protuberance, on the inside, to the posterior border of the sterno-cleido-mastoid muscle at its insertion; while a few fibres were attached separately to the superior curved line of occipital bone above the others.

Of the muscles of the ear, intrinsic or extrinsic, although frequently examined, I have not noted the variations with any regularity.

Retrahens aurem.—This muscle I have seen usually formed of two very distinct slips, and somewhat less frequently of three fasciculi, a condition which was looked upon by Albinus as the normal arrangement (*tres retrahentes auriculam*). The lowest of the three bundles I have found arising in two instances from the cervical fascia over the upper part of the sterno-cleido-mastoid muscle. In a few cases one of the bundles was found replaced by a tendinous band.

Attollens and *Attrahens aurem* I have frequently found meeting at their adjacent edges so as to form one continuous plane of muscular fibres, as described by Cruveilhier (*muscle auriculaire superieur ou auriculo-temporal*). The origin of attrahens aurem from the zygoma, described as normal by Wharton, Jones, and Harrison, I have met with in eight cases. Cruveilhier describes this as a distinct muscle under the name of *muscle auriculaire anterieur profond*, whose posterior attachment is into the external surface of the tragus.

The intrinsic muscles of the auricle have so often eluded my attempts to define them, that I do not think I succeeded in any one case in demonstrating the presence of all of them in the same subject.

Depressor auriculae (Lauth); *stylo-auricularis* (Hyrtl).—Of this muscle I found one example. In three other cases I was able to define a well-marked fibrous cord, having the direction and attachments presented by the muscular fibres when present. In my case the origin was in common with that of the stylo-glossus muscle, and the insertion into the cartilaginous part of the external auditory meatus.

The muscles of the tympanum and the internal muscles of the orbit I have not examined with a special view to variations in attachment. An accessory slip to the obliquus oculi superior (*comes obliqui superioris; obliquus accessorius; gracillimus oculi; gracillimus orbitae*) I have twice seen. In one case the origin of the anomalous bundle of muscular fibres was in common with the levator palpebrae superioris, and the insertion into the fibrous pulley for tendon of superior oblique (*rectus quintus* of Molinetti; *tensor trochleae* of Budge).

Depressor supercilii (Lesshaff); *depressor palpebrarum* (Arlt); *lachrymalis anterior* (Henke).—Of this muscle the fibres were found moderately well developed in two cases out of seven in which it was looked for. In the others it was almost completely absent: a few fibres were found with difficulty in two of them.

Depressor palpebrae inferioris (Caldani).—This muscle, which seems to be a continuation of some of the fibres of the platysma myoides, I have been able to define clearly in five out of eighteen cases in which it was searched for, the upper extremity being attached to the lower fibres of the orbicularis palpebrarum.

Orbicularis palpebrarum.—A slip from this muscle to the levator palpebrae superioris is described by Henle and noticed by Professor Macalister. I consider it to be a not uncommon arrangement, as I have found it developed in a considerable number of instances, although I did not take any note of the proportion. The origin of the zygomaticus minor from the lower fibres of the orbicularis I have twice observed.

Levator labii superioris.—The only deviation from the usually accepted description of this muscle which I have met with is the tricipital arrangement described by Eustachius, the outer coming from the malar bone (*caput zygomaticum, jochbeinzacke* of Henle). This bundle of fibres was well developed in about one-third the cases examined.

Depressor septi mobilis narium (Meyer, Krause), *depressor apicis naris, nasalis labii superioris, nasolabialis*—looked upon by many as merely a septal attachment of the *orbicularis oris*, has been more correctly described by Meyer as a separate muscle of triangular form. The base is below, blending with the upper fibres of the orbicularis oris, and apex above, attached to the lower border of the septal cartilage.

Risorius (Santorini).—The typical arrangement of the fibres of this muscle—from parotidean fascia to angle of mouth, blending with orbicularis oris—is met with in a large proportion of cases. The fibres in their inward course pass superficial to those of the platysma myoides, and form with the latter an acute angle. The risorius of most of our text-books of the present day is derived from the platysma itself, but the description is I think rather a loose one, and not borne out by the results of careful repeated examination. Rarer origins have been described—from the zygoma (M'Whinnie); external ear (Albinus): fascia over upper third of sterno-cleido-mastoid (Hallett); an accessory head from transversus nuchae (F. E. Schultze)—of each of these I have met with examples.

Transversus menti (Santorini); *faisceau sous-symphysien* (Cruveilhier).—This band of muscular fibres prolonged from the antero-internal part of the triangularis menti, meets a similar one from the opposite side in the mesial line. On its presence the existence of a "double-chin" depends. I have found it in three cases out of eleven in which it was searched for. From its peculiar action on the contour of the submental region, it has been called by German authors the *doppelkinnmuskel.*

Masseter.—The only anomaly I noticed in connexion with this muscle was a coalescence of its deeper fibres with the lower fibres of the temporal. This condition has been also observed by Professor Macalister, and I have met with it three times. The *bursa masseterica* described by Monro between the two parts of this muscle I have failed to find, although I have carefully examined the muscle for this special purpose in thirty subjects. Of the bursa described by Hyrtl between the deep part of the muscle and the capsule of the temporo-maxillary articulation I have met several examples.

Buccinator.—A few fibres of this muscle I have seen to arise from Steno's duct in three instances.

Pterygoideus proprius (Henle, Gruber, Theile, Macalister).—Of this muscle I have met with three examples in one hundred and twelve bodies, passing as usual from the crest on the great wing of sphenoid to posterior edge of external pterygoid plate.

Sterno-cleido-mastoideus.—Of this muscle I have met with many anomalies, in some cases completely divided into sterno-mastoid and cleido-mastoid: of this I have met with eleven examples. The cleido-mastoid I have found in three cases divided into two completely separate superimposed laminae, distinct to the mastoid attachment. In five cases I have seen the upper sternal fibres of the pectoralis major taking an accessory tendinous origin from the outer edge of the sternal head of this muscle.

Levator claviculae (Wood).—Of this muscle I have seen one very well developed specimen attached at its upper end to anterior tubercles of transverse processes of second, third, and fourth cervical vertebrae, and below to the middle third of upper border of clavicle outside the cleido-mastoid.

Coraco-cervicalis (Krause, Hallett).—Of this muscle, which is no other than the posterior belly of omo-hyoid terminating in the cervical fascia—when the anterior belly is absent—I have met with two examples. I have in another case traced a small aponeurotic slip from the upper edge of the tendon formed by posterior belly of omo-hyoid, along the normal course of anterior belly to the body of the hyoid bone.

Omo-hyoid.—Of the origin of the posterior belly of this muscle from the coracoid process I have met with seven examples (*coraco-hyoid* of Gruber). In one case the origin of this belly was from the acromion process. (Origin from first rib as described by Wagner and Gruber I have never seen.) Of the purely clavicular origin I have met with two specimens; in each case the muscle was monogastric, and presented at the level of the normal tendon merely a few longitudinal tendinous fibres on its deep surface (*cleido-hyoid* of Schmidtmüller). In addition to the variations above described under the head of the musculus coraco-cervicalis I have found in two other cases the anterior belly represented by *two* distinct tendinous slips passing from the normal tendon up to body of hyoid bone.

Crico-corniculatus (Tourtual): *kerato-cricoid* (Merkel): *crico-thy-*

reoideus posticus (Bochdalek).—Of this muscle I have found seven cases of unilateral development, and two others in which its fibres were symmetrical.

Crico-epiglotticus.—Under this name has been described a bundle of muscular fibres often found (thirty-four per cent., Krause) arising from the inner surface of cricoid cartilage, and passing upwards beneath the mucous membrane to the margin of the epiglottis. I have been able to define it three times in nineteen subjects. It was bilateral in each case. Sometimes a similar bundle terminates in the arytaeno-epiglottidean fold of mucous membrane forming a crico-membranosus.

Crico-trachealis.—Of this anomalous muscle I have met with one specimen on the left side of the body of a female subject. It came from lower border of cricoid cartilage, approaching close to the median line in front, and having a breadth of about half an inch above; it gradually narrowed as it passed down to its insertion into the fourth and fifth rings of the trachea behind the isthmus of the thyroid body.

Thyreo-trachealis (Gruber); *thyreo-trachealis profundus* (Krause).—From lower border of thyroid cartilage to upper part of trachea. This band of muscular fibres I found three times in twenty-eight subjects in which its existence was specially searched for. The muscle was symmetrical in one case; in the others single; in both on left side. The inferior attachment varied in all. In one case the insertion was into the third ring of the trachea; in another into third and fourth. In the case in which the muscle existed on both sides the insertion was into the fourth and fifth rings on one side (the left); on the other into the fifth ring alone.

Thyreo-syndesmicus (Sömmerring).—From superior corner of thyroid cartilage to posterior border of thyro-hyoid ligament. In one subject I found this small anomalous band of muscular fibres present on both sides. I have met with no other example.

Thyreoideus transversus anomalus (Gruber) (s. *impar*); *thyreoideus marginalis inferior; incisurae* (*cartilaginis thyroideae*) *mediae transversus.*—This band of muscular fibres crosses from one side of lower border of ala of thyroid cartilage to the other, lying in front of the upper part of the crico-thyroid membrane. I have met with two examples.

Thyreo-corniculatus.—Fibres arising in common with the upper fibres of thyreo-arytaenoideus, and passing obliquely upwards and backwards to the cartilage of Santorini. A bundle of fibres answering to this description I have met with in two cases out of nineteen in which they were sought for with special care. A similar bundle of fibres going to the cartilage of Wrisberg has been described under the name of—

Thyreo-cuneiformis.—This I have not seen.

Thyreo-epiglotticus inferior (s. *major*) and *superior* (s. *minor*).—Two very thin laminae of muscular fibres arising from inner surface of thyroid cartilage, and ascending to the adjacent margin of the epiglottis, some blending with upper fibres of arytaeno-epiglottideus. *Inferior* frequently takes some fibres of origin from upper border of thyro-arytenoideus. I have found one or both of these strata in about one-half of the cases in which they were carefully sought for before decomposition had advanced too far, but always in an extremely atrophic state. Those fibres, which go directly to the margin of the epiglottis itself, have also been described under the name of *musculus epiglottidis* (*reflector* s. *depressor epiglottidis*.)

Thyreo-epiglotticus longus (C. Krause).—This band of muscular fibres I have found in two cases out of twenty-seven in which it was carefully sought for. Arising from inner surface of ala of thyroid cartilage, immediately above the incisura thyreoidea inferior lateralis, it passes upwards on the outer side of the thyreo-arytaenoideus, to be inserted with the fibres of the thyreo-ary-epiglotticus into the corresponding lateral margin of epiglottis.

Thyreoideus internus; sub-thyreoideus (Krause).—According to this author, a muscular bundle may be found in from 15 to 20 per cent. of all cases examined, passing from lower margin of ala of thyroid cartilage, near the middle line, backwards to the posterior attachment immediately above the root of the inferior cornu. I have found it twice in forty-three bodies.

Thyreoideus proprius (Krause).—The name has been applied by this author to a delicate layer of muscular fibres lying on the inner surface of the thyroid cartilage, and reaching from the incisura superior nearly to the inferior margin. In their descent they interlace with the other internal muscles. I have in a few cases found a small number of scattered vertical fibres in this situation, but never so arranged as to form a distinct layer.

Syndesmo-thyreoideus.—This name has been applied to a small muscle found in very rare instances (one per cent. according to Krause) passing from upper part of inner surface of thyroid cartilage to posterior thyro-hyoid ligament. I have met with it twice: in one subject it was symmetrically developed on both sides.

Kerato-arytaenoideus (*schildknorpelhorn-giessbeckenknorpels-muskel* of J. Gruber).—Arises from posterior border of inferior cornu of thyroid cartilage, and is inserted into the muscular process of the arytaenoid. I have found four examples.

Other anomalous laryngeal muscles have been described by many writers—such as the *hyo-epiglotticus* (Fabricius); *crico-epiglotticus* (Verheyen); *glosso-epiglotticus* (Eustachius); but I have never met with a specimen of any of them.

Digastric.—The only noteworthy anomaly of this muscle I have met with is a doubling of the anterior belly, the anomalous slip going to the median raphe of the mylo-hyoid muscles. Once I have found it symmetrical, the two supernumerary slips meeting in the mesial line, and in three other cases the anomaly existed on one side only.

Mento-hyoid (Macalister).—Of this muscle I have met with four examples. In all it lay superficial to the anterior belly of digastric, as it passed from front of body of hyoid bone to lower border of inferior maxilla. In one instance it was symmetrically developed.

Mylo-hyoideus.—The only remarkable variation I have seen in the attachments or relations of this muscle was a perforation of the posterior part by Wharton's duct, which came under my observation twice.

Genio-hyoideus.—I have in a good many cases found this muscle inseparably blended with the lower fibres of the genio-hyo-glossus.

Mylo-glossus (Rolfincius).—Of this muscle I have met with one example, passing in its usual direction from angle of jaw to side of base of tongue.

Stylo-glossus.—In five instances I have found this muscle with an accessory head from the stylo-maxillary ligament. Twice I have found it completely absent on one side.

Stylo-hyoideus.—In several instances I have seen the two parts into which this muscle was split by the tendon of the digastric separate from the origin to the insertion. I have seen the muscle inserted into the tendon of the digastric in one case. One instance of complete absence was noted.

Triticeo-glossus (Bochdalek, Macalister).—This anomalous bundle of muscular fibres I have succeeded in defining but five times in forty-four cases in which it was carefully sought for. This is much below the average of frequency which occurred in the experience of Bochdalek (8 in 22), and Macalister (1 in 6). Professor Krause makes the proportion of cases in which it occurs to vary from 17 to 36 per cent.

Azygos linguae; musculus longitudinalis linguae inferior medius (Bochdalek).—A small median bundle of longitudinal fibres found between the genio-hyo-glossi muscles in the posterior fourth of the tongue. I have been able to define it in five bodies out of forty-seven in which it was sought for.

Genio-glossus accessorius (Luschka).—A bundle of the lower fibres of the genio-hyo-glossus—from lowest part of genial tubercle to hyoid bone. I have succeeded in defining such a bundle as Luschka describes, separated from the other fibres of the genio-hyo-glossus about once in seven subjects.

Cephalo-pharyngeus (Sandifort).—Of this anomalous band of muscular fibres I have seen a good many examples:—Three arising from vaginal process of temporal bone; two from petrous portion of temporal bone (*petro-pharyngeus*) inside the inferior opening of the carotid canal; two from the spinous process of the sphenoid; one from the cartilaginous portion of Eustachian tube (*salpingo-pharyngeus*). In the majority of instances the fibres became united to those of the superior constrictor of the pharynx. In two examples they could be traced directly to the inferior constrictor.

Genio-pharyngeus (Winslow).—A slip closely connected along the anterior part of its course with the genio-hyo-glossus, and passing backwards to the side of the pharynx with the fibres of the superior constrictor. I have found several examples.

Syndesmo-pharyngeus.—This name has been given to a small fasciculus of muscular fibres passing from the posterior border of the thyro-hyoid ligament backwards to the median line (*linea alba*) of the pharynx. It bridges over the space intervening between the origins of the middle and inferior constrictors. I have found it twice in forty-seven subjects in which it was specially sought for.

Levator glandulae thyroideae lateralis.—Under this name Krause mentions a few fibres of the inferior constrictor of the pharynx which take origin from the side of the thyroid body. He says it is present in about one per cent. of subjects examined. I have not been so fortunate as to meet with a specimen.

Azygos pharyngis (Meckel); *solitarius pharyngis* (Santorini).—Under this name Meckel describes a small muscle, usually mesial and single, rarely bilateral and symmetrical (Ketel, 1870), passing from the pharyngeal spine on the basilar process of the occipital bone downwards for a variable distance along the median raphe of the pharynx, into which it is inserted. It is seldom more than half an inch in length. I have found it four times in eighty-seven subjects: once bilateral.

Pharyngo-mastoideus (Ketel).—Arises from the anterior and inner aspect of the mastoid process, and passes inwards between superior and middle constrictors of pharynx to its insertion into the lateral wall of the tube, blending with the fibres of these muscles. I have met with three examples.

Salpingo-pharyngeus (Sandifort).—A muscular fasciculus passing from Eustachian tube to side of pharynx behind the palato-pharyngeus. I have met with one example.

Scalenus anticus.—I have occasionally seen this muscle taking a vertebral origin more or less than that usually described. The only other remarkable peculiarity I have ever observed is, that in two instances I found the phrenic nerve piercing its fibres.

Scalenus medius.—The superior attachment of this muscle, as Krause has correctly pointed out, is from the anterior, *not the posterior* tubercles of transverse processes of the cervical vertebrae, as other anatomists describe it. The usual number is six—all excepting the atlas—but I have found the number to vary from three, the smallest, to all, seven. In one case I found it attached below to the second rib only. In a very large proportion of subjects I found its vertebral attachment quite inseparable from the scalenus postieus.

Scalenus posticus.—In only two instances did I observe any notable anomaly of this muscle. One was complete absence. The other was attachment of lower end to third rib.

Scalenus minimus (Albinus).—The usual origin of this muscle is from the anterior tubercles of transverse processes of fifth, sixth, and seventh cervical vertebrae, behind the attachment of anterior scalenus, to which it is often inseparably adherent. Its inferior extremity is connected to the second rib. Macalister makes the relative frequency of its presence three times in seven subjects, and "oftener present inseparably united to the other scalenes." Krause gives a proportion of forty-two per cent. I have not been able to find it in so large a proportion of cases: it was well defined five times in twenty-three bodies.

Scalenus lateralis (Albinus); *musculus costo-transversalis.*—This muscle arises from the transverse process of the seventh cervical vertebra, and passes downwards between the middle and posterior scaleni and a little outside the latter (of which it would seem to be a detached portion) to its inferior attachment to second rib. I have found it four times: it was present in two of the twenty-three subjects in which the scalenes were specially dissected.

Scalenus accessorius.—Arises from the posterior tubercles of transverse processes of the cervical vertebrae from the fourth to the sixth (Macalister), from fourth to seventh (Krause), and is inserted into the first rib close to the scalenus medius, of which it seems to be a differentiated portion. It is separated from the latter muscle by part of the brachial plexus.

Transversalis cervicis anticus longus colli accessorius (Luschka); *scalenus anticus proprius colli* (Krause).—This rare muscle arises from the anterior tubercles of the transverse processes of the cervical vertebrae, from the seventh to the fourth, and passing upwards is attached to the anterior surface of body of axis immediately below the superior articulating surface, and to the front of the base of the transverse process of the atlas. It is placed posterior to the rectus capitis anticus major. I have met but one example of this muscle.

Transversalis cervicis anticus (Retzius).—Arises from the oblique processes of the cervical vertebrae, from the sixth to the fourth; being intimately connected to the longus colli, and passing upwards is inserted into the upper three cervical vertebrae. Of this rare muscle I have met with two specimens. One had the attachments described by Retzius; the second was attached by its upper extremity to the axis alone, just below and outside the superior articular surface.

Transversalis cervicis medius (Krause).—Of this extremely rare muscle I have never met with an example. Krause has found it attached to the front of the transverse processes of the cervical vertebrae, from the second to the sixth or seventh.

Transversalis cervicis posticus minor; trachelomastoideus minor; trachelomastoideus accessorius.—Arises from transverse processes of vertebrae, from the second dorsal to the fifth cervical, and ascending to its insertion is attached above to the transverse process of the atlas, and mastoid process of the temporal bone. I have noted one specimen.

Rhomboideus occipitalis (Murie, Mivart); *occipito-scapularis* (Wood).—Arises from the internal third of the linea semicircularis media ossis occipitis, above the attachment of the complexus, and is inserted into the scapula, above the rhomboideus minor. I have met with three specimens of this muscle.

Levator claviculae (Wood); *cleido-cervicalis superior; trachelo-clavicularis superior.*—The clavicular attachment of this muscle is either to the middle third of the bone, or to its acromial extremity. The upper is more variable in its points of fixation. It has been found attached to the transverse process of the atlas (*cleido-atlanticus*); to that of the axis (*cleido-epistrophicus*); to the oblique processes of the fourth and fifth cervical vertebrae (*cleido-cervicalis inferior; scalenus anticus accessorius*); to the transverse process of the sixth alone (*cleido-cervicalis imus*). It has also been found attached to the transverse process of the third cervical vertebrae. The lower has, in some instances, been seen to blend with the trapezius. I have met with two specimens of the cleido-cervicalis imus, and one of the cleido-epistrophicus. Another specimen I have found attached above to the oblique processes of the third, fourth, and fifth cervical vertebrae, and inserted below into the middle third of upper border of clavicle.

Rhombo-atloideus (Macalister, 1866); *splenius accessorius* (Krause); *adjutor splenii* v. *m. singularis splenius accessorius* (Walther).—This muscle passes from the spinous processes of the last cervical or first dorsal vertebra—where it arises beneath the rhomboideus minor—to the transverse process of the atlas. It has been found attached to the sixth and seventh cervical spines, or to the seventh alone, or to the first and second dorsal spines, or to the second and third. I have found three examples in which the muscle arose from the last cervical and first dorsal spines, and one in which it arose from the three upper dorsal. In two cases the origin was from the two upper dorsal vertebrae. Mr. Wood found it three times in thirty-six subjects, and Krause gives eight as its percentage of frequency. I have found it six times in seventy-five subjects.

Atlanto-mastoideus.—Arises from transverse process of atlas, and is inserted into the posterior border of the mastoid process of the temporal bone. Krause makes its relative frequency to be thirty per cent. of subjects examined; this is much greater than what has occurred in my experience, as I have found it but four times in thirty-three subjects which were carefully examined for it.

Rectus capitis anticus major, . . . *minor.*—Doubling of these muscles I have pretty often observed, but have kept no account of the relative frequency.

Rectus capitis lateralis accessorius (Winslow).—This muscle, a doubling of the normal rectus capitis lateralis, I have found three times in thirty-three subjects in which it was specially sought for.

Pectoralis major.—The three parts of this muscle I have found completely distinct in four instances. The clavicular, sternal, and costal portions could easily be differentiated even down to their very insertion into the humerus. In two cases I have seen an accessory slip to the short head of the biceps taking origin from the lower border of the tendon. In one case the tendon divided into two parts, between which passed the long tendon of the biceps, one lamina going to either lip of the bicipital groove.

Pectoralis major accessorius.—Arises from the costal cartilages, from the first or second to the sixth or seventh, and passes outwards beneath the deep fibres of the pectoralis major to join the tendon of insertion. It is but a complete differentiation of the costal portion of the pectoralis major.

Chondro-epitrochlearis.—Of this muscle I have met with four specimens. The attachments were the same in all cases. The origin was from the sixth costal cartilage, and the fibres were placed in close apposition with the lower fibres of the pectoralis major. The insertion was into the brachial aponeurosis at the lower fourth of the arm on its inner aspect—one sending a slight tendinous slip down to the epitrochlea. So that the muscle in all these cases better deserved the name of *chondro-fascialis*.

Pectoralis minor.—In five cases I have seen the tendon of this muscle send a strong slip over the coracoid process to pierce the coraco-acromial ligament, and blend with the capsule of the shoulder-joint. In one instance the whole tendon wound over the coracoid process, and divided into two strong bands; one went to the margin of the glenoid cavity, the second to the greater tuberosity of the humerus.

Pectoralis minimus (Gruber).—Arises from anterior surface of manubrium sterni, rhomboid ligament, and cartilage of first rib, and passes outwards in front of the costo-coracoid membrane to be inserted into the inner border of the coracoid process of the scapula. It sometimes arises from the cartilage of the first rib alone, and such was the origin of the muscle in the two examples which I have met with.

Pectoralis quartus.—Arises from the fascia over the lower part of the serratus magnus, and occasionally from the adjacent portions of one or more ribs, and is inserted into the lower border of the tendon of the great pectoral, or into the ~~oschelbogue~~ of Langer. achsel

Subclavius.—This muscle I have found completely absent in two instances. In both the deficiency was on the left side.

Supra clavicularis proprius, v. *tensor fasciae colli* (Gruber); *anomalus claviculae.*—Of this muscle I have met with two examples, one of which has been already recorded (vide *Journal of Anatomy and Physiology*, xv. 139).

The second specimen (observed during the last winter session) had similar attachments, but was much smaller.

Acromio-clavicularis, v. *praeclavicularis lateralis* (Gruber).—Consists of a few muscular fibres passing from the outer third of the clavicle to the tip of the acromion. I have, on one occasion, seen a small band of fibres in situation so very delicate as hardly to deserve the dignity of a special name. It lies superficial to the upper fibres of the deltoid.

Omo-clavicularis (*coraco-clavicularis*, v. *coraco-clavicularis posticus*, Calori, Gruber).—This muscle arises from the outer end of the clavicle, less frequently from the inner end, sometimes also from the manubrium sterni, and passes outwards to be inserted into the coracoid process of the scapula. The insertion is sometimes into the upper border of this bone. A similar muscular band has been described by Mr. Wood under the name of—

Scapulo-clavicularis.—This I have never succeeded in finding, although I have sought for it in more than a hundred and twenty subjects.

Sterno-clavicularis; sterno-clavicularis anticus; prae-clavicularis medius (described and named by Gruber).—Arises from manubrium sterni, anterior sterno-clavicular ligament, and cartilage of first rib—sometimes from only one of these points of attachment—and passes outwards in front of the subclavius to be inserted into the middle third of the clavicle. It has been found inserted into the coracoid process of the scapula, when it received the name of—

Coraco-clavicularis anticus, v. *singularis.*—Of the latter insertion

I have met with one case. I have never seen the more frequent form of this anomaly.

Supra-clavicularis; sterno-clavicularis (Hyrtl); *sterno-clavicularis superior; sterno-omoideus.*—Arises from anterior surface of manubrium sterni, and is inserted into the front of the clavicle at a variable distance from its outer end. When symmetrically developed, the two muscles often meet in the middle line, forming a

Musculus interclavicularis.—Of this latter form of the anomaly I have seen two examples. I have observed but one specimen of unilateral development.

Retro-clavicularis (Weber); *sterno-clavicularis posticus.*—Arises from posterior surface of manubrium sterni, and is inserted into the inner end of the clavicle, on its posterior surface. I have seen one specimen, but it had, as in the one observed by Lawson Tait, a second head from the posterior sterno-clavicular ligament.

Infra-clavicularis (Bardeleben).—Arises from front of clavicle, and is inserted into the fascia in front of the pectoralis major. I have met with one example: it arose fleshy from the clavicle for about an inch of the middle of its anterior border and formed a tendinous expansion, which, passing downwards and outwards, and intersecting, at a very acute angle, the line of direction of the clavicular fibres of the pectoralis major, bended with the fascia, in front of the latter muscle, after a course—including the length of the fleshy fibres—of about four inches. So far as I know, this is the only example published, except that of Bardeleben.

Subclavius posticus; scapulo-costalis; sterno-scapularis.—Arises from the first rib, and is inserted into the root of the coracoid process of the scapula, or into the ligament of the notch. I have seen but one example occurring in a large number of subjects, having examined this region carefully for anomalies, in over a hundred. Krause says the frequency of its occurrence averages seven per cent., and according to Professor Macalister it is met with once in fifteen subjects.

Supra-costalis superficialis (vel *anterior*).—A bundle of muscular fibres passing from one of the upper ribs (generally the first) to another rib at a variable distance below. It lies beneath the pectoralis major and minor.

Supra-costalis profundus.—This bundle of fibres, when present, lies beneath the serratus anticus magnus. I have met with a good many specimens of both *superficialis* and *profundus*, but did not feel sufficiently interested in the anomaly to keep any record of them.

Transversus colli (Luschka); *costo-fascialis cervicalis* (Macalister).—This muscle arises from the first rib, and passing obliquely inwards behind the clavicle, and between the sterno-hyoid and sterno-thyroid muscles, is inserted into the deep fascia at the root of the neck (septum thoracico-cervicale). Professor Krause suggests that it may be regarded as an upper differentiated digitation of the triangularis sterni muscle.

Tensor semivaginae articulationis humero-scapularis (Gruber).—This rare muscle arises from the front of the manubrium sterni and cartilage of first rib, and passes outward between pectoralis major and minor, to be inserted into the front of the capsule of the shoulder-joint. I have found on one occasion a bundle of fibres arising from the cartilage of the first rib at its junction with the bone, and passing outwards between the greater and lesser pectoral muscles, to be inserted into the anterior aspect of the shoulder capsule.

To the anomalies of the muscles of the back, of the diaphragm, and of the flat muscles of the abdomen I have not given special attention, although some remarkable deviations from the typical arrangement have been met with.

Basio-deltoideus; fasciculus infraspinata deltoideus (Gruber).—This bundle of fibres is accessory to the normal deltoid muscle, and corresponds to the abductor brachii inferior of the lower mammals (W. Krause, *Anatomie des Kaninchens*, 1868). It arises from the vertebral border of the scapula at a variable level, sometimes as low down as the inferior angle of the bone, and passes outwards to join the lower fibres of the deltoid. Of this form of the accessory muscle I have met with two examples. Other accessory bundles have been described. One from the axillary border of the scapula has been named *costo-deltoideus:* a separate slip from the acromial end of the clavicle has been named *acromio-clavicularis lateralis.* Still rarer specimens are those which have been described under the names of *tensor fasciae deltoideae a fascia infraspinata* and *tensor fasciae deltoideae a margine axillari scapulae,* respectively. I have never met with any of these latter forms.

Infra-spinatus.—This muscle I have twice seen to receive an accessory slip from the deltoid. I have seen a good many specimens (over five in number) in which it was quite inseparable from the teres minor. The upper fibres of the muscle are sometimes quite separate from the remainder, forming what has been described as the *infra-spinatus minor.* Of this variety I have seen one well-defined example.

Teres minor.—Fusion with the infra-spinatus has been already mentioned. Complete absence of the muscle I have once observed.

Teres minimus.—Under this name has been described a bundle of fibres parallel to and in close contact with the lower edge of the teres minor. I have seen one example occurring on both sides of a male subject of great muscular development.

Subscapularis minor; subglenoidalis; infra-spinatus secundus; subscapulo-humeralis; subscapulo-capsularis.—Under this name has been described an upper detached portion of the subscapularis muscle. Arising from the upper part of the axillary border of the scapula, sometimes from the tuberculum infra-glenoidale, where it adheres to the long head of the triceps, it passes outwards to be inserted either with the normal subscapular tendon into the lesser tuberosity of the humerus, or what much more frequently happens, into the front of the capsule of the shoulder-joint (*subscapulo-capsularis*, Gruber, Macalister). According to Professor W. Krause, the frequency of its occurrence varies from five to thirty-three per cent. I have found it four times in thirty-nine subjects, whose bodies were carefully examined for it: three were inserted into the capsule—one into the lesser tuberosity of the humerus. Professor Krause also mentions among the varieties of the sub-scapularis a bundle of fibres arising from the lesser tuberosity or its immediate vicinity, and going to be inserted into the capsule of the joint. It is present, according to him, in about 0·4 per cent. of the cases examined, and has received the name of

Capsularis humero-scapularis.—I have never succeeded in finding it.

Gleno-brachialis (Gruber), arises with the long head of the biceps from the tuberculum supra-glenoidale, pierces with it the shoulder capsule, and is inserted into the humerus. I have once met with it; the insertion was into the inner edge of the bicipital groove about three-quarters of an inch below the lesser tuberosity.

Coraco-brachialis.—The anomalies of this muscle are numerous, and I have met with examples of nearly all those which have been hitherto described, but regret to say that I have kept no record of their relative frequency in my cases. Three conspicuous forms of this muscle have been described by Wood: *brevis*, *medius*, and *longus*.

Coraco-brachialis brevis.—In its more typical form this muscle arises from the apex of the coracoid process, beneath the ordinary coraco-brachialis, and is inserted into the surgical neck of the humerus below the lesser tuberosity. It has been found by Macalister inserted into the tendon of the subscapularis, and sometimes into the capsule of the shoulder-joint (*coraco-capsularis*); he has also found its fibres blending with those of the subscapularis muscle. Under the head of sub-varieties of this anomaly must be classed the following:—

Depressor tendinis subscapularis majoris, vel *retinaculum musculare tendinis subscapularis majoris* (Gruber); *tensor capsulae humeralis*; *deltoidius profundus*, which arises from the lower border of the tendon of the subscapularis, and is inserted into the surgical neck of the humerus; and

Tensor fasciae et cutis foveae axillaris, which is merely formed by a detached slip of the other inserted into the skin and fasciae of the axilla. I have found examples of all these abnormalities excepting the last mentioned.

Coraco-brachialis medius.—This I have several times found as a distinct muscle. In all it was pierced by the musculo-cutaneous nerve. In two instances I have seen a muscular slip detached from this muscle to join the inner head of the triceps, and crossing in front of the brachial artery.

Coraco-brachialis longus.—This muscle I have found completely separate in only two instances. In both cases the insertion was into the internal brachial ligament about an inch above the epicondyle. In its downward course the muscle crossed over the brachial artery and median nerve.

Biceps brachii.—As the result of very careful examination in the human subject, and comparison of the arrangement of its fibres with the analogous muscle in the lower animals, Professor W. Krause has concluded that it is really made up of four distinct parts, to which he gives the respective names of *coraco-radialis*, *coraco-ulnaris*, *gleno-radialis*, and *gleno-ulnaris*. The two first named form the short head, while the union of the third and fourth segments forms the long or glenoid portion. Although it may be rather difficult for most anatomists to agree entirely with his views, a careful consideration of them certainly tends to throw a good deal of light on the peculiarities of its variations.

Coraco-radialis.—Alone, is present in *Orycteropus capensis*, rhinoceros, echidna, frog, toad, lizard.

Coraco-radialis and *coraco-ulnaris.*—In emys, chameleon.

Coraco-radialis and *gleno-ulnaris.*—In marsupialia, both muscles being quite separate.

Gleno-radialis.—Alone, in nycto-pithecus, stenops, talpa, horse, ruminantia.

Gleno-ulnaris.—Alone, in *Hyrax capensis*, rodentia.

Gleno-radialis and *gleno-ulnaris.*—In pig, monotremata.

Doubling of the heads. I have observed two examples of duplicity of the long head, and one of that of the short.

The two heads of the muscle I have seen separate for the whole length of its course. The long head I have found completely absent in three cases, and the short head in one. The semilunar aponeurosis I have found completely absent in one case. I have twice found an accessory slip from the tendon of the pectoralis minor going to the short head. An accessory slip from brachialis anticus to biceps I have found in three cases of forty-nine subjects, in which these muscles were carefully examined. An additional head between coraco-brachialis and biceps I have found present five times in the same series of bodies. This nearly agrees with the results of Wood and Macalister, who make its relative frequency to be one in ten. In one case I have found two supernumerary heads arising in this region. The upper came directly from the insertion of the coraco-brachialis, from which it arose by a tendinous slip. The other came from a point about an inch lower down, and was adherent to the adjacent margin of the brachialis anticus. Its origin was entirely fleshy. An additional origin from the great tuberosity I have seen in one case. It has also been described by Meckel and Macalister. Under the denomination of supernumerary attachments of the biceps must also be classed the following varieties, which have been described under separate names:—

Brachio-radialis (Gruber, Theile, &c.).—Arises from the humerus between the insertion of the deltoid and the origin of the supinator longus, and passing down close to the outer margin of the biceps, but distinctly separate from the latter, to be inserted with it into the tuberosity of the radius. I have found this muscle extremely well developed in two instances, but it adhered very intimately to the lower part of the muscular portion of the triceps, and almost inseparably to its tendon.

Brachio-fascialis; brachialis accessorius; supinator brevis accessorius

(Struthers).—This slip arises from the inner side of the biceps, and passing obliquely downwards and inwards, crosses in front of the brachial artery, and is inserted into the fascia over the pronator radii teres. Of this anomaly I have met with four examples.

Brachialis anticus.—This muscle I have found in three instances completely cleft from origin to insertion—but its attachments were in other respects quite normal. Continuity of its outer fibres with those of the supinator longus, as described by Wood and Macalister, I have seen in one case, giving rise to the formation of a tunnel through which passed the musculo-spiral nerve with the accompanying branch of the superior profunda artery. An accessory head from coraco-brachialis I have seen in two instances. Of its inferior attachments I have seen the following varieties:—sending a slip to the tendon of the pronator radii teres—this I have observed twice; a slip to the supinator longus below the level of the elbow joint—this I have seen occurring on both sides in one subject; a slip to the flexor sublimis digitorum—of which I found one example in a very muscular subject (male).

Brachialis internus minor.—Of this muscle, which is but a detached slip of the brachialis anticus, I have met with three specimens in forty-nine subjects. In two cases it lay on the radial side of the muscle, and was inserted into the radius at the inferior part of the bicipital tuberosity; in one it lay on the inner side of the muscle, and was inserted separately a little below the level of coronoid process.

Triceps brachii.—I have seen few noteworthy variations from the typical attachments of this muscle. Apparent direct continuity of the triceps and anconeus I have several times observed. A distinct slip from the tendon of the subscapularis at its attachment of the lesser tuberosity I have once seen. In two cases of seventeen subjects (which were specially examined for it) I found a bursa between the internal part of the triceps and the ulnar nerve as it lies behind the epitrochlea. (*Bursa mucosa retro-epitrochlearis* of Gruber.) I have noted four examples of the accessory slip from the lower border of the tendon of the latissimus dorsi, described by Professor Halbertsma under the name of *anconeus quintus.*

Another muscular slip has been described under the name of *anconeus quintus* (vel *minimus*); *epitrochleo-anconeus* (of Gruber); *anconeus epitrochlearis* (Wood).—This muscle arises from the back of the inner condyle of the humerus, and is inserted into the olecranon process of the ulna. Its bulk and extent of attachment are very various; according to most authorities it would seem to be present in about a fourth of the subjects examined.

Subanconeus.—The only peculiarity I have met with in this muscle is the frequency of its absence. Indeed I have but seldom been able to define its existence as a separate muscle, and have been led to wonder why it is described in all the hand-books as a separate muscle. Under the head of the anomalies of the triceps extensor cubiti, I would also include the slip described by Gruber under the name of the *levator tendinis latissimi dorsi.* It arises from the coracoid process and adjacent part of the capsule of the shoulder-joint, and is inserted into the upper margin of the tendon of the latissimus dorsi.

Supinator radii longus accessorius; brachio-radialis accessorius; brachio-radialis brevis (*vel minor*).—Arises with the supinator longus and is inserted a little below the level of the tuberosity of the radius. I have seen one specimen: it is present, according to Krause, in about one per cent. of the bodies examined. The insertion of supinator radii longus I have found double in one case, the upper tendon being attached to the outer surface of the radius about three inches above the level of the styloid process. The radial head passed between it and the lower tendon, which had the normal insertion of supinator longus.

Extensor carpi radialis accessorius (Wood).—Arises from the outer condyle of the humerus below the attachment of the extensor carpi radialis longior, and travels with the latter muscle—passing through the same groove in the posterior annular ligament of the wrist, and goes thence to its insertion into the base of the first metacarpal bone. I have found it once in a muscular subject. The inferior attachment of this muscle may be into the back of the scaphoid bone, or base of first metacarpal, or into both, as it was in my case; or into outer edge of abductor pollicis, or of outer head of flexor brevis pollicis.

Pronator radii teres.—The two heads of this muscle I have found separate through their whole length down to the radial insertion. It occurred in three instances; in one case on both sides. Twice I have seen a third head arising from the ulna about two inches below the level of the coronoid process.

Flexor carpi radialis.—This muscle I have seen in four instances taking an accessory slip from the inner margin of the coronoid process of the ulna. In two of them the median nerve passed between the heads. With regard to its insertion, I agree with Professor W. Krause in making the normal one to be into both second and third metacarpal bones. This I found to be the case in nineteen out of thirty-four specimens of the muscle, in which the attachments were made out with care. In one of these cases the insertion was into the trapezium; in another into trapezium and second metacarpal; in another into third and fourth metacarpal.

Flexor carpi radialis brevis (v. *profundus*); *radio-carpus* (Fano); *radialis internus brevis* v. *minor*, v. *profundus* (Gruber).—One well-developed specimen of this muscle was found among the thirty-four subjects whose fore-arms I specially examined for muscular anomalies. The origin was from the radius outside the flexor pollicis longus, reaching from the lower end of the oblique line down to about the junction of middle with lower third of outer edge of pronator quadratus. Its tendon passed through a separate canal in the anterior annular ligament close to that for the flexor carpi radialis, and divided into two slips, which went to be inserted into the front of the bases of the second and third metacarpal bones. I have met since with two other specimens of this muscle, similar in origin, but neither nearly so well developed. The insertion varied in each case: one was inserted into the trapezium (the true *radio carpus* of Fano); the other was inserted by two slips into trapezium and base of second metacarpal bone (*radio-carpo-metacarpalis*).

Palmaris longus.—This, which enjoys the distinction of being the most variable muscle in the body, I found absent in four of thirty-four subjects. In one case the deficiency was symmetrical; in the other three unilateral—two on the left side, one on the right. In the case of bilateral absence, the subject was a female, the others were males. A second head from the coronoid process was present in two instances. There was one example in which the fleshy belly was two and a-half inches in length. In one case the tendon was inserted directly into the outer margin of the abductor pollicis, just below its origin.

I have since met with a specimen in which the insertion was into the tuberosity of the scaphoid bone. Also an example of doubling of the muscle, both heads coming from the internal condyle, but the second head lying beneath the other, and not coming from the common tendon. The deep head has received the name of *palmaris longus accessorius* (Krause).

Flexor digitorum sublimis.—Absence of the tendon for the little finger I have observed in three instances. The index flexor I have, in two cases, found quite distinct from the rest of the muscle, from its origin to its insertion.

Flexor carpi ulnaris.—This muscle I have once found wholly inserted into the anterior annular ligament. The palmaris longus was absent.

Flexor carpi ulnaris brevis.—Of this muscle I have met with one specimen. The origin was from the ulna, inside the upper end of the flexor digitorum sublimis, for about two inches in length. It passed through a separate canal in the anterior annular ligament, and was inserted into the base of the fourth metacarpal bone.

Flexor digitorum profundus.—The only notable variety of this muscle I have seen was a complete isolation of the index portion along its whole length. This occurred twice in thirty-four subjects examined; and I have seen some other examples, of which I took no note.

Flexor digitorum profundus accessorius; musculus accessorius ad digitorum profundum (Gantzner).—One example of this muscle I have seen arising from the inner side of the coronoid process; it formed two tendons which went to the middle and little fingers. The tendons pierced the corresponding ones of the sublimis, and were accompanied by very small tendinous bands from the normal flexor profundus.

Flexor pollicis longus.—This muscle received, in two cases of the thirty-four subjects specially examined, an accessory head from the internal condyle. The coronoid head, which in some form was present in eighteen cases, arose separately in nine; in common with the deep head of pronator radii teres, in three; closely adherent to the coronoid head of flexor sublimis digitorum, in four; and by a slip common to all three in the remaining two. An accessory slip, coming directly from the fleshy fibres of the flexor sublimis digitorum, was present in one case; and such a muscular bundle is mentioned by Krause under the name of *fasciculus exilis*.

Pronator radii quadratus.—Complete separation into two parts occurred twice in thirty-four subjects, and I have seen several other examples. The bilaminar form described by Meckel and Macalister occurred once. Once the muscle almost formed a triangle, the truncated apex of which was formed by the radial end.

Cubito-carpeus.—This rare muscle arises from lower end of ulna, where it is in close contact with the pronator quadratus, forming, in fact, a detached portion of the latter; and it passes inwards to be inserted into the tuberosity of the scaphoid bone and base of the first metacarpal. It nearly corresponds to the *ulno-carpalis singularis anterior* of Gruber; but the latter is large at its ulnar attachment as the normal pronator, and is wholly inserted into the carpus.

Tensor ligamenti annularis (v. *orbicularis*) *dorsalis* (v. *posterior*).—Arising from the ulna behind the lesser sigmoid cavity, it is inserted into the posterior surface of the orbicular ligament of the radius. I found it as a distinct slip six times in thirty-four subjects. According to Macalister, its proportional frequency as a separate muscle is twenty-five per cent. of subjects examined; according to Gruber it has been found in seventy-four per cent. of fore-arms.

Tensor ligamenti annularis (v. *orbicularis*) *volaris* (v. *anterior*).—Arises from the coronoid process of the ulna, and is inserted into the anterior surface of the orbicular ligament of the radius. It is much less frequently seen than the other: it occurred in my cases twice in thirty-four subjects: according to Krause, the average frequency of its occurrence is seven per cent.

Supinator radii brevis accessorius.—Is a small slip from the brachialis anticus, going to the tubercle of the radius. I have seen two specimens.

Extensor carpi radialis longior; brevior.—These muscles I have found completely inseparable five times in thirty-four bodies. In one of the cases three tendons were given off—one to the second metacarpal bone, two to the third. In another instance a normal longior sent an accessory tendon to accompany that of brevior. Brevior had a double insertion in two of the fore-arms into second and third metacarpal bones.

Extensor communis digitorum.—Absence of the little finger tendon occurred in three of the subjects already referred to. Doubling of one or more of the tendons occurred in a large proportion of cases, but I made no note of the exact number.

Extensor minimi digiti.—This was completely absent in one instance. In two other cases there was a double tendon: in one of these the two slips were inserted together; in the other the second tendon went to the metacarpal bone of the ring finger. In one case the muscle was double, the second part forming the *extensor minimi digiti accessorius* (Krause).

Extensor brevis digitorum manus.—A rudimentary muscle, which is found in various forms of development on the back of the hand. The proportion of cases in which it occurs is, according to Krause, from three to seven per cent. It arises most frequently from the posterior annular ligament (Krause); sometimes from the end of the radius (Albinus, Humphry); from the bases of one or more of the metacarpal bones (Wood, Macalister, &c.). I have seen but one specimen; it arose from the bases of the second and third metacarpal bones, and took some fibres from the adjacent part of the posterior annular ligament, and gave off two tendons which went to the index and middle digits—each joining with the corresponding tendon of the long extensor.

Extensor ossis metacarpi pollicis.—The tendinous end of this muscle presents very frequent variations. I have seen the tendon double; the second slip going in one case to the trapezium; in two instances to the abductor pollicis. A triple tendon occurred once: one had the normal attachment, the other two slips went to the trapezium, and to outer edge of abductor pollicis respectively. A quintuple tendon existed in one case: two of the slips went to the normal insertion, two to the trapezium, and one to become fused with the extensor primi internodii pollicis.

Extensor primi internodii pollicis.—This muscle was completely absent in one case; and in two others sent an accessory tendinous slip to the extensor secundi.

Of the muscles of the thenar eminence few notable variations were observed.

Abductor pollicis brevis alter; abductor pollicis internus.—Of this accessory bundle of muscular fibres—arising with the normal abductor and on its inner side—I have seen two examples.

Adductor pollicis.—In a large number of cases (of which, indeed, I kept no accurate record) the radial artery divided the muscle into two parts, as has been specially described by Bischoff, who has given the two divisions the names of *adductor pollicis obliquus*, and *adductor pollicis transversus* respectively.

Abductor minimi digiti.—This muscle I have found arising by two completely separate heads; one from the pisiform bone, the second from the anterior annular ligament.

Lumbricales.—The first was absent twice in thirty-four subjects. Both first and second were absent in another.

Psoas parvus.—A remarkable specimen of this muscle was met with last session. It had the usual origin; but the insertion was into the side of the cartilage between third and fourth lumbar vertebrae.

Iliacus minor; ilio-capsularis.—Analogous to the subscapularis minor in upper extremity. Arises from anterior inferior spine and ilio-femoral ligament, and is inserted, a little above the iliacus tendon, into the spiral line.

Tensor vaginae femoris.—In one case the origin of the muscle was three-quarters of an inch distant from the anterior superior spine of the ilium. The only other variation I have observed is the great difference in the length of its fibres in different subjects.

Sartorius.—I once found inserted into the inside of the capsule of the knee-joint.

Adductor minimus (Henle); *adductor quartus* (Diemerbroek).—This muscle is merely the upper and outer part of adductor magnus; I consider it worthy of separate mention because I have found it quite a distinct muscle in the vast majority of cases I have examined. This has also been the experience of Professor Macalister.

Gluteus quartus; invertor femoris; scansorius.—This muscle is formed by a differentiated portion of the anterior part of the glutaeus minimus. When present its origin reaches as high as the anterior superior spine of the ilium. I have found it very distinct in three cases.

Gemellus superior.—This muscle I have found frequently absent. The inferior muscle I have never missed.

Quadratus femoris was found completely absent in two instances. One of these has been already published.

Biceps flexor cruris.—A third head to this muscle from the upper part of the linea aspera I have once seen. Absence of the short head was noted in two instances.

Gastrocnemius.—A third head of this muscle from the popliteal surface of the femur I have twice seen (*gastrocnemius tertius*, Krause). Accessory fibres of outer head arising from the external lateral ligament of the knee-joint I have found present in five instances.

Popliteus.—I have once found an accessory slip to this muscle arising above the normal popliteus from the external condyle of the femur.

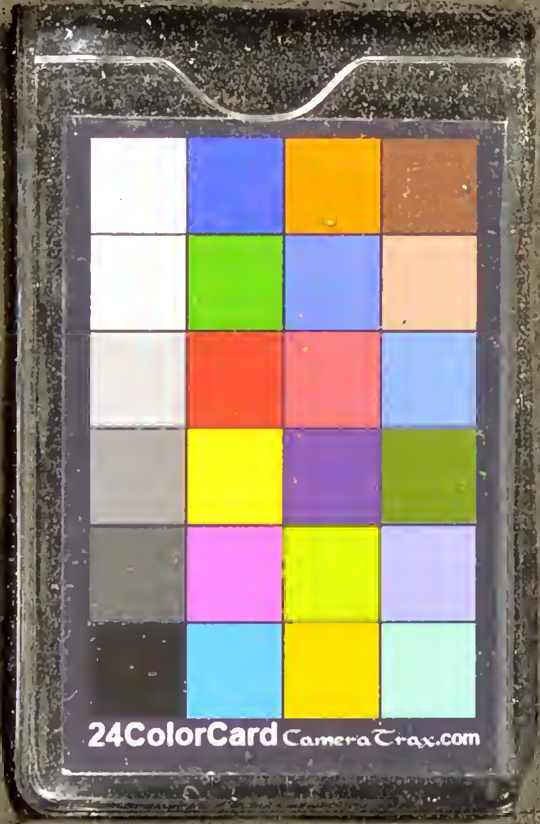
Tensor capsuli tibio-tarsalis.—A very well developed specimen of this muscle I have once met with, arising from the outer surface of the tibia for the lower third, below and outside the tibialis anticus, and going to be inserted into the anterior annular ligament of the ankle-joint.

Peroneus quartus (Otto); *sextus* (Macalister); *p. accessorius.*—Of this muscle I have found one well-developed specimen (already published). It arose from the lower part of outer surface of fibula, where its fibres were found continuous with the lower part of the peroneus brevis. The insertion was into the outer surface of the os calcis, just behind the peroneal tubercle.

Peroneo-tibialis.—Arises from inner side of fibula just below the head, and is inserted into the oblique line of the tibia. Krause says it is present in eighteen per cent. of the subjects examined, and considers it analogous to the ulnar head of pronator radii teres. I have found it four times in forty-nine subjects in which it was specially looked for.

Pronator pedis; peroneo-calcaneus internus.—Arises from the fibula beneath and outside the origin of the flexor longus pollicis, and is inserted into the inside of the os calcis. It was considered by Meckel to be the analogue of the pronator quadratus in the upper extremity. I have seen but one example. The insertion was into the sustentaculum tali.

Besides the anomalies enumerated in the preceding pages, I have in my possession scattered notes of a considerable number, still unclassified, chiefly of the muscles of the lower extremity, which time has not permitted me to tabulate, but of which I shall take the earliest opportunity that time may afford to publish a complete list.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